REMARKS

Claims 1-25 are pending.

The Applicant summarizes the content of the Office Action mailed April 16, 2004 as follows: claims 1-3, 5-7, 21 and 24 stand rejected as obvious under 35 U.S.C. §103(a) over Ikeda (4,567,493) in view of Yaegashi et al. (5,270,730); claims 21 and 24 stand rejected as obvious under 35 U.S.C. §103(a) over Ikeda (4,567,493) in view of Eida (4,338,611); claim 8 is rejected as obvious under 35 U.S.C. §103(a) over Ikeda (4,567,493) in view of Yaegashi (5,270,730) and further in view of Hanson (4,635,073); claims 1-7 and 9-25 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-20 of co-pending Application No. 10/620,197 in view of Ikeda (4,567,493); and claim 8 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-4, 9, 11, 13, 15, and 16 of co-pending Application No. 10/620,197 in view of Ikeda (4,567,493) and Hanson (4,635,073).

In general, all the Examiner's obviousness rejections depend on Ikeda for its teaching of thicknesses for both the resistor and protective layers. Specifically, the Examiner states "Ikeda et al. teaches an . . . ink jet print head comprising:...A resistor layer (207) having . . . a thickness of 10 angstroms . . . A first protective layer (208) . . . having a thickness of 1000 angstroms . . . A third protection layer (210) . . . having a thickness of 100 angstroms . . . ***Thus, the thickness of the resistor and the protective layer equals 1110, which is about 1000 angstroms.***" (*Bold-Italics Added*)(*Office Action pg. 2-3*). While the difference between the actual thickness, 1,110 angstroms, and the approximate value used by the Examiner, 1,000 angstroms, may seem negligible, placing these dimensions within the context of the Ikeda patent shows Ikeda as teaching a heater thickness in excess of 1,110 angstroms, not a thickness of about 1,000 angstroms.

From Ikeda's specification, the resistor thickness ranges from 10 to 50,000 angstroms (*Ikeda col. 6:67-68*), the first protective layer thickness ranges from 1,000 to 50,000 angstroms (*Ikeda col. 4:25-26*), and the third protection layer thickness ranges from 100 to 50,000 angstroms (*Ikeda col. 6:12*). Thus, Ikeda teaches an

overall thickness ranging from a floor of 1,110 angstroms (10 + 1000 + 100) to a ceiling of 150,000 angstroms (50,000 + 50,000 + 50,000). Ikeda then teaches preferred ranges that are concentrated well within the floor and ceiling values. (*Ikeda patent col. 4:25-27, 6:9-13, and 6:63-68*). Thus, Ikeda focuses on thickness limitations between the floor and ceiling and the floor and ceiling values constitute extremes in the teaching. Accordingly, nothing in Ikeda would lead one skilled in the art to ranges outside the floor-to-ceiling range, especially beneath the floor limitations since skilled artisans know the difficulty in making extremely thin heater layers.

The Examiner relies on Yaegashi for a teaching "that it is notoriously old and well known in the ink jet [sic] that a heater having an area of 100 to 30,000 sq. microns is a suitable size for providing good discharge characteristics." (*Office Action, page 3*). The heater 2 taught by Yaegashi, however, relates to one for discharging "a normally solid recording material (i.e., a recording material or ink which is solid at room temperature (but can be liquid at an elevated temperature))." *Col. 1, ll. 11-14.* Again, at *col. 5, ll. 31-38*:

> the recording method according to the present invention, a normally solid recording material (ink, i.e, a recording material which is sold at room temperature (5° C. - 35° C) is melted under heating, and the melted recording material is supplied with a heat energy corresponding to given recording data to be ejected through an ejection outlet (orifice) for recording.

Together, these statements lead skilled artisans away from traditional ink jet printers with heaters useful for ejecting ink that is liquid at room temperature. In the Background Section, Yaegashi expressly disparages prior art ink jet printers (Figures 22, 23A-23C, 24A, 24B and 25) that utilize such liquid ink. Among some of the statements, liquid ink is "required to satisfy contradictory properties that they are quickly dried to be fixed on the recording medium but they do not readily plug a nozzle due to drying in the nozzle." *Col. 1, ll. 61-65.* At *col. 2, l. 2, et seq.*:

> [w]hen such inks are used for recording on plain paper, there are encountered several problems such that the inks

> are not quickly dried to be fixed and the ink image immediately after the printing is liable to be attached to hands on touching and smeared to lower the printing quality.
>
> Further, the ink penetrability remarkably varies depending on the kind of recording paper . . .

Since Ikeda and the present invention teach the liquid inks so remarkably distinguished by Yaegashi, the Applicant respectfully submits the combination of Yaegashi and Ikeda is improper. As the law provides, it is error to find an invention obvious where the prior art references diverge from and teach away from the invention at hand. *W.L. Gore & Assocs. v. Garlock, Inc.* 220 USPQ 303, 311 (Fed. Cir. 1983).

Regarding Eida, the Examiner states "Eida et al. teaches an ink jet print head having a heater made of HfB_2 and an area that ranges from 250 sq. microns (Table 1, example 5) to 400 sq. microns (see Table 1, example 11)." (*Office Action pg. 4*). To obtain these areas from examples 5 and 11, the Applicant presumes the Examiner multiplied dimension "a" by dimension "l." Upon close inspection, however, the Applicant submits that heater area cannot be obtained by multiplying dimension "a" by dimension "l." From the specification, Eida defines "a" as "the length from said orifice to said energy acting zone" (*Eida Patent; col. 3:38-39*) and "l" as "the length of said energy acting zone along the moving direction of the liquid" (*Eida patent; col. 3:37-38*). As clearly depicted in FIG. 1a (below), the lengths "a" and "l" are parallel line segments. Accordingly, there is no definable area between the two segments and it is impossible for them to define the dimensions of any heater. As a result, Eida does not teach heaters with areas from 250 to 400 sq. microns in examples 5 and 11 or elsewhere.

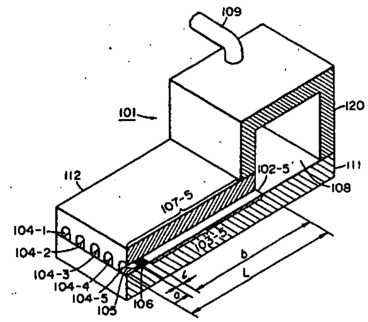

FIG. 1A

At *col. 7, ll. 5-6*, Eida does teach area, however, via formation of an electro-thermal transducer 110 with a "rectangular heat energy acting surface 114 of 40 μm x l." At *col. 7, ll. 59*, the parameter "l" ranges from "10 to 800 μm" and TABLE 1 embodies specific examples thereof. As the Examiner points out, Specimen No. 11 teaches a parameter "l" of 10 μm thereby rendering the rectangular heat energy acting surface 114 of an electro-thermal transducer 40 μm x 10 μm, or 400 μm^2. This specimen, however, represents the absolute smallest square micrometer teaching in the entire patent. The Specimen No. 5 cited by the Examiner has an "l" value of 50 μm which would render an area of 40 μm x 50 μm, or 2000 μm^2, not 250 μm^2 as suggested.

Further, beneath TABLE 1, Eida establishes the "Standard for Evaluation" of a specimen as "Extremely good" while lesser performing specimens receive a "Good" (O symbol in TABLE 1) or "Practically satisfactory" (Δ symbol in TABLE 1) rating. From TABLE 1, and based upon the Δ symbols under the "Stability in Droplet Discharging" and "Characteristic in Continuous Droplet Discharging" columns, one skilled in the art recognizes the parameters of Specimen No. 11 constitute a floor beyond which electro-thermal transducers may not stably function. ***Thus, Eida exclusively teaches electro-thermal transducers having square micrometer areas of 400 or greater.***

Since all pending claims recite a heater area of less than 400 micrometers squared, a heater thickness less than 1100 angstroms and/or a heater thickness in a range to about or less than about 1000 angstroms, the Applicant submits the

patentability of all claims, especially those rejected as obvious variants of the combined teachings of Ikeda and Eida or Ikeda and Yaegashi.

Moreover, absolutely nothing in Ikeda, Eida and/or Yaegashi would lead one skilled in the art to a specific stable microjoule range for firing a heater having a heater length multiplied by a heater width in a given range or for firing a heater with any variety of heater thickness. The particular claims having such limitations include claims 4 and 11-20. Specifically, claim 4 requires "wherein an energy to emit an ink drop from the heater chip during use is in a range from about 0.007 to about 0.06 microjoules." Claims 11-15 require the heater "adapted to emit an ink drop with an energy pulse in a range from about 0.007 to about 0.83 microjoules." Claim 16 requires "a range from about 0.007 to about 0.69 microjoules." Claims 17-20 require "less than about 0.64 microjoules.."

The Applicant submits nothing in this Amendment constitutes new matter. For support, please see the ranges of limitations in Figures 10-12 and the specification at page 12, lines 8-11 where the Applicant states:

> [w]hat was discovered was that stable performance, and thus an understanding of an appropriate heater energy per volume, occurred generally when the data points had higher heater energy per volume to the right of the "knee-bend" of the data points shown in the vicinity of data points 195.

At page 2, lines 11-14, the Applicant further states:

> [i]n one embodiment, the heater chip includes a heater having a length, width and thickness. The length multiplied by the width (heater area) is in a range from about 50 to 500 micrometers squared while the thickness is in a range from about 500 to about 5000 or 6000 angstroms.

Responsive to the Examiner's rejections under the judicially created doctrine of obviousness-type double patenting, the Applicant hereby submits a Terminal Disclaimer in compliance with 37 CFR §1.321(c). Under this document, the common

assignee, Lexmark International, Inc., disclaims the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term, as presently shortened by any Terminal Disclaimer, of any patent granted on the co-pending application, Application No. 10/620,197. It is noted for the record that Lexmark International, Inc. is the current owner of both applications. A Power of Attorney and Correspondence Address Indication, a Statement Under 37 CFR 3.73(b), an inventor(s) Assignment and Recordation forms are also provided to show same. As stated in the attached Fee Transmittal Form, the Commissioner may deduct the required fee in accordance with 37 CFR §1.20(d) from Deposit Account No. 11-0978.

Accordingly, the Applicant submits that all pending claims are allowable over the prior art and respectfully requests notification of same. In the event, however, the Examiner disagrees or feels prosecution might be advanced with a telephonic interview, he is invited to call the undersigned representative.

Although no fees, other than those authorized on the enclosed Fee Transmittal Form, are believed due, the Applicant authorizes deduction of any necessary fees from Deposit Account 11-0978.

Respectfully submitted,

KING & SCHICKLI, PLLC

Michael T. Sanderson
Registration No. 43,082

King & Schickli, PLLC
247 N. Broadway
Lexington, KY 40507
(859) 252-0889

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States postal Service as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on July 7 2004 by Carolina Perdomo